

**8-3 The student will demonstrate an understanding of materials that determine the structure of Earth and the processes that have altered this structure. (Earth Science)**

**Key Concepts:**

**Earth Layers:** crust, mantle, core

**Seismic waves:** primary, secondary, surface

**Earthquake:** epicenter, seismograph

**Rock types:** Igneous, Sedimentary, Metamorphic

**Rock cycle:**

**Earth Resources:** minerals, ores, fossil fuels

**Plate Tectonics:** lithospheric plates, plate boundaries

**Geologic Processes:** volcanic eruptions, mountain building

**Geologic Imagery:** aerial photography, satellite imagery, topographic maps

**Supporting Content Web Sites**

The Earth's Layers

[http://volcano.und.nodak.edu/vwdocs/vwlessons/lessons/Earths\\_layers/Earths\\_layers1.html](http://volcano.und.nodak.edu/vwdocs/vwlessons/lessons/Earths_layers/Earths_layers1.html)

Using diagrams and text, this website explains the layers of Earth including relative position, density, and composition.

Indicators 8-3.1

Seismic Waves

<http://aspire.cosmic-ray.org/labs/seismic/index.htm>

Through animations, text, and questions, this website explains the 3 types of seismic waves.

Indicators: 8-3.2

Michigan Tech UPSeis

<http://www.geo.mtu.edu/UPSeis/studying.html>

Through diagrams, illustrations, and text, this website gives information on seismographs, seismograms, and how to locate the epicenter.

Indicators: 8-3.3

World of Rocks

<http://www.albany.edu/dept/sisp/jjpowers/WebCollabS05/rocks/index2.html>

This website explains the 3 large classifications of rock and using a diagram explains the rock cycle. A notes page is provided for students to use.

Indicators: 8-3.4

Mountain Maker, Earth Shaker

<http://www.pbs.org/wgbh/aso/tryit/tectonics>

Using animations, this website explains the geologic activity at the plate boundaries.

Indicators: 8-3.6

### Volcanoes Online

<http://library.thinkquest.org/17457/english.html>

This website is designed as a tool to teach students about the structure of volcanoes, how they erupt, and the effects/advantages.

Indicators: 8-3.7

### The Southern California Integrated GPS Network Education Module

<http://scign.jpl.nasa.gov/learn/plate6.htm>

Through animation and text, this website explains the various stresses that cause faults.

Indicators: 8-3.7

## **Suggested Literature**

Ford, Brent A. (1996) *Project Earth Science: Geology*. Arlington, VA: NSTA Press

ISBN: 0-87355-131-1

The main theme of this book is plate tectonics. Explanations of volcanoes, earthquakes and other geologic events are explored.

Indicators: 8-3.6

Downs, Sandra (2000) *Earth's Fiery Fury*. Frederick, MD: Twenty-First Century Books

ISBN: 0-7613-1413-X

This book provides a good picture of the dynamic forces that constantly change our Earth. It is a good resource to teach the structure of the Earth.

Indicators: 8-3.6 , 8-3.7

Johnson, Rebecca L. (2005) *Plate Tectonics*. Twenty-First Century Books/Lerner Publishing Group

ISBN: 0-8225-3056-2

This volume describes in excellent detail the chronology of the plate tectonics theory and the evidence that finally led to its acceptance. It is a superb example of the arduous journey from hypothesis to scientific theory.

Indicators: 8-3.6

Maslin, Mark (2000) *Restless Planet Series: Earthquakes*. Chicago IL. Raintree Publishers

ISBN: 0-7398-1328-5

This book addresses the causes of earthquakes and uses historic earthquake disasters to illustrate the magnitude of the events.

Indicators: 8-3.8

## **Suggested Data Streaming Video**

### **Earth Science: Earthquakes (ETV Streamline SC)**

Segments : Plate Tectonics- The Science of Earthquakes (4:20) & Fault lines and Earthquakes (3:02)

This video explains how the earth's crust floats on tectonic plates that shift and collide causing seismic activity.

Indicators: 8-3.6 & 8-3.8

### **Earthquakes-Our Restless Planet (ETV Streamline SC)**

This video will show students how earthquakes are triggered by movements in the great plates that form a shell around the earth. They will better understand terms such as faults, seismic waves, focus, epicenter, magnitude and seismograph.

(20:00)

Indicators: 8-3.1, 8-3.2, 8-3.6

### **Greatest Discoveries With Bill Nye (ETV Streamline SC)**

Segments: Inside Our Planet: The Outer Core (3:07) and The Inner Core (3:50)

This video will explain the inner and outer cores of the earth and how scientist used seismic wave to determine the internal structure of Earth.

Indicators: 8-3.1 & 8-3.2

### **Earth Science: Rocks and Minerals (ETV Streamline SC)**

Segment: Introduction to Rocks and Minerals (3:18)

This video clip explains how different kinds of rocks are constantly being eroded and reformed in a process called the rock cycle.

Indicators: 8-3.4

### **Basics of Geology-Formation of Continents and Mountains (ETV Streamline SC)**

Segments: Lesson One-B The Structure of the Earth (2:07)

Lesson Two-Mountains, Volcanoes and Earthquakes (11:12)

This video clip demonstrates the dynamics of the plate tectonics theory. Concepts such as folding and buckling, subduction, volcanism, undersea mountains and earthquakes are explored.

Indicators: 8-3.1, 8-3.7

### **Earth Science: Mapping the Earth (ETV Streamline SC)**

Segment: Remote Sensing: Satellites: Observe the earth from above (3:59)

Satellites orbiting Earth gather visual images and measure radio waves to paint a very accurate picture of the planet.

Indicators: 8-3.9

## **Career Connections**

**Geologists** study the composition, processes, and history of the Earth. They try to find out how rocks were formed and what has happened to them since their formation. They also study the evolution of life by analyzing plant and animal fossils.

**Volcanologists** study the remains of either dead or dormant volcanoes, or monitor volcanoes that are dormant, but may become active or "reawaken." A significant portion of a volcanologist's work is also done in the laboratory and office, analyzing rock samples, reading and writing scientific papers, performing computer modeling of various aspects of eruptions, and interpreting the data that they have collected from the field. Basically, the goals of volcanology are to understand how and why volcanoes erupt, how to predict eruptions, their impacts on the history of the Earth and how they may affect humans and their environment. It is also important for volcanologists to be able to interpret and publish/present their findings in such a way that it is easy for the general public to understand.

**Seismologists** are scientists who study earthquakes and seismic waves. They study the earth movements - like mini earthquakes - that may precede a major volcanic eruption. The Seismologist may also set up monitoring equipment near to the volcano. The seismologist is an important scientific member of the team in helping scientists predict eruptions. They may be helped in their task in predicting an eruption by the geo-chemist and others who will measure the gases from the volcano.